Remarks

The Examiner has rejected claims 1-54 under 35 U.S.C. §103(a) as being unpatentable over Reese et al., United States Patent No. 5,656,791 (hereinafter "Reese") in view of Mravic et al., United States Patent No. 6,158,351 (hereinafter "Mravic") and the Goetzel article.

Rejection under 35 U.S.C. § 103(a)

The Examiner has rejected claims 1-54 under 35 U.S.C. §103(a) as being unpatentable over Reese in view of Mravic and the Goetzel article. The applicant traverses the Examiner's rejection of claims 1-54 and specifically traverses the Examiner's contention that the teaching of Reese and teaching of Mravic can be combined to result in the claimed invention. The teachings of more than one reference may be considered in combination only when there is some teaching or suggestion to support their use in combination.[1]

In the present case, assuming arguendo that the presently claimed invention can be found in the combination of Reese and Mravic, which it cannot, the teachings of Reese and Mravic are in non-analogous fields of art.[2] The question asked in determining whether references are in an analogous art is whether an inventor

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[1] SmithKline Diagnostics, Inc. v. Helena Lab. Corp., 859 F.2d 878 886-87, 8 U.S.P.Q.2d (BNA) 1468, 1475 (Fed. Cir. 1988).

[2] *See* In re Oetiker, 977 F.2d 1443, 24 U.S.P.Q.2d (BNA) 1443 (Fed. Cir. 1992) (holding that a prima facie showing of obviousness can be overcome by showing that the obviousness is in a non-analogous field of art).

PAGE 15/48 * RCVD AT 4/21/2004 9:33:25 PM [Eastern Daylight Time] * SVR:USPTO-EFXRF-1/0 * DNIS:8729306 * CSID:2143638177 * DURATION (mm-ss):16-44

in that field of endeavor would have logically been exposed to that art, from an objective point of view.[3] Mravic is directed to providing an improved projectile that is substantially lead free due to the significant environmental hazard lead can pose at a shooting range. Specifically, Mravic states that:

> There are at least six requirements for a successful lead free bullet. First, the bullet must closely approximate the recoil of a lead bullet when fired so that the shooter feels as though he is firing a standard lead bullet. Second, the bullet must closely approximate the trajectory, i.e. exterior ballistics, of a lead bullet of the same caliber and weight so that the practice shooting is directly relevant to shooting in the field with an actual lead bullet. Third, the bullet must not penetrate or damage the normal steel plate backstop on the target range and must not ricochet significantly. Fourth, the bullet must remain intact during its travel through the gun barrel and while in flight. Fifth, the bullet must not damage the gun barrel. Sixth, the cost of the bullet must be reasonably comparable to other alternatives. (Column 3, Lines 3-17).

Mravic further highlights the third requirement specified above by stating that:

> The third requirement, not penetrating or damaging the steel backstops at target shooting ranges, dictates that the bullet must either (1) deform at stresses lower than that sufficient to penetrate or severely damage the backstop, (2) fracture into small pieces at low stresses or (3) both deform and fracture at low stress. (Column 3, Lines 22-27).

On the other hand, Reese is directed to a liner for a shaped charge formed from a particular mixture of powered metals. The shaped charges described in Reese are for use in downhole

[3] Wang Lab. Inc. v. Toshiba Corp., 993 F.2d 858, 26 U.S.P.Q.2d (BNA) 1767 (Fed. Cir. 1993).

PAGE 16/48 * RCVD AT 4/21/2004 9:33:25 PM [Eastern Daylight Time] * SVR:USPTO-EFXRF-1/0 * DNIS:8729306 * CSID:2143638177 * DURATION (mm-ss):16-44

perforating operations. Specifically, Reese describes the purpose of the shaped charges as follows:

> Shaped charges are used for the purpose, among others, of making hydraulic communication passages, called perforations, in wellbores drilled through earth formations so that predetermined ones of the earth formations can be hydraulically connected to the wellbore. Perforations are needed because wellbores are typically completed by coaxially inserting a pipe or casing into the wellbore, and the casing is retained in the wellbore by pumping cement into the annular space between the wellbore and the casing. The cemented casing is provided in the wellbore for the specific purpose of hydraulically isolating from each other the various earth formations penetrated by the wellbore.
>
> Shaped charges known in the art for perforating wellbores can include a housing, a quantity of high explosive . . . inserted into the housing, and a liner which is inserted onto the high explosive. . . . When the high explosive is detonated, the force of the detonation collapses the liner and ejects it from one end of the charge at very high velocity in a pattern called a "jet". The jet penetrates the casing, the cement and a quantity of the formation. (Column 1, Lines 23-35).

As those skilled in the art of shaped charge perforating guns will understand, the "jet" formed upon the detonation of a shaped charge is not a projectile but instead, the "jet" formed upon the detonation of a shaped charge is a high-energy stream of gases and particles. As such, the metallurgy associated with a projectile, such as the bullet of Mravic, does not provide any teaching relevant to the design of a liner for a shaped charge, such as that of Reese. An inventor in the field of shaped charge liners would not, from an objective point of view, have been logically exposed

PAGE 17/48 * RCVD AT 4/21/2004 9:33:25 PM [Eastern Daylight Time] * SVR:USPTO-EFXRF-1/0 * DNIS:8729306 * CSID:2143638177 * DURATION (mm-ss):16-44

to the bullet art. Accordingly, the bullet of Mravic and the shaped charge liner of Reese are in non-analogous arts.

In addition, Mravic teaches away from any combination of its teaching with those of Reese. Specifically, one of the most important aspects of the bullet of Mravic is that is must be designed ***not to penetrate*** or damage a steel plate backstop. The liner of a shaped charge, one the other hand, is specifically intended ***to penetrate***, not only, a steel barrier in the form of the casing that lines a wellbore, but also, the cement and a quantity of the formation. As such, taking the teaching of Mravic and applying it to the shaped charge liner art would result in an inoperable shaped charge that would be incapable of penetrating a steel barrier. Accordingly, Mravic teaches away from any combination of its teaching with those of Reese. For at least these reasons, applicant believes that it is improper to combine the teaching of Mravic with that of Reese. The applicant therefore believes that the rejection of claims 1-54 under 35 U.S.C. §103(a) as being unpatentable over Reese and Mravic should be withdrawn and that claims 1-54 should be allowed.

Furthermore, even if it were proper to combine the teachings of Mravic and Reese, which it is not, any such combination would not result in the present invention. Likewise, adding the teaching of Goetzel to the teachings of Mravic and Reese still does not result in the present invention.

PAGE 18/48 * RCVD AT 4/21/2004 9:33:25 PM [Eastern Daylight Time] * SVR:USPTO-EFXRF-1/0 * DNIS:8729306 * CSID:2143638177 * DURATION (mm-ss):16-44

Mravic teaches combining a ferrotungsten with a lower density second component having suitable ferromagnetic constituents to form a projectile. Specifically, Mravic states that:

> Suitable ferromagnetic constituents for the high density first component include ferrotungsten and cemented tungsten carbide alloys having a ferromagnetic addition. Ferrotungsten is generally understood to be a tungsten base alloy that includes iron having a tungsten content by weight of from about 70% to about 85%. Preferably, the carbon content of the ferrotungsten is less than about 0.6%. In this patent application, any tungsten base alloy containing iron that exhibits ferromagnetism is included.
>
> In the projectile, the ferrotungsten is present in a weight percent above about 50% and preferably from about 70% to 90% is preferred.
>
> When the second constituent of the projectile is to provide the ferromagnetism, suitable ferromagnetic constituents for the lower density second component include iron, nickel and cobalt. Iron is most preferred due to its low cost. Preferably, the iron is present in an amount of from about 10% to about 30% by weight. (Column 4, Lines 4-20).

Reese teaches combining a powdered tungsten with a powdered metal binder in particular ranges to form a shaped charge liner. Specifically, Reese states that:

> A range of compositions of powdered metal mixture, including powdered tungsten up to about 90 percent by weight and powdered metal binder of 10 percent by weight, down to powdered tungsten of about 70 percent by weight and powdered metal binder to 30 percent by weight has been tested. It has been determined through this testing that mixture compositions within the specified range still provide effective shaped charge performance.
>
> Typically, the powdered metal binder comprises powdered lead. Alternatively, . . . the powdered metal binder can comprise bismuth. While lead and bismuth are more typically used for the powdered metal binder, other metals having high ductility and malleability can be used for the powdered metal binder. Other metals which have

PAGE 19/48 * RCVD AT 4/21/2004 9:33:25 PM [Eastern Daylight Time] * SVR:USPTO-EFXRF-1/0 * DNIS:8729306 * CSID:2143638177 * DURATION (mm-ss):16-44

high ductility and malleability comprise tin, uranium, silver, gold, antimony, zinc, cobalt and nickel.

The present invention also provides for compositions for the liner 5 to include powdered copper intermixed with the powdered binder metal and powdered tungsten. (Column 3, Line 55 - Column 4, Line 7).

Goetzel teaches that oil can be used as a lubricant in powdered metal mixtures.

None of the art cited by the Examiner teach the use of a powdered heavy metal such as tungsten in a mixture with a powdered metal binder wherein the weight percent of the powdered heavy metal is greater than 90 percent. None of the art cited by the Examiner teach the use of tungsten in a mixture with a powdered metal binder that includes molybdenum. None of the art cited by the Examiner teach the use of tungsten in a mixture with a powdered metal binder that includes tantalum. None of the art cited by the Examiner teach the use of tungsten in a mixture with a powdered metal binder that includes lead and molybdenum. None of the art cited by the Examiner teach the use of tungsten in a mixture with a powdered metal binder that includes lead and tungsten. None of the art cited by the Examiner teach the use of tungsten in a mixture with a powdered metal binder that includes lead, molybdenum and tungsten. None of the art cited by the Examiner teach the use of tungsten in a mixture with a powdered metal binder that includes lead, copper and tungsten. None of the art cited by the Examiner teach the use of tungsten in a mixture with a powdered metal binder

PAGE 20/48 * RCVD AT 4/21/2004 9:33:25 PM [Eastern Daylight Time] * SVR:USPTO-EFXRF-1/0 * DNIS:8729306 * CSID:2143638177 * DURATION (mm-ss):16-44

that includes lead, molybdenum, copper and tungsten. None of the art cited by the Examiner teach the use of tungsten in a mixture with a powdered metal binder that includes lead, molybdenum and copper.

As to claims 1 and 9, neither Mravic, Reese nor Goetzel, either alone or in combination, teach, disclose or suggest a liner for a shaped charge compressive formed from a mixture of 90 to 97 percent by weight of powdered heavy metal and 10 to 3 percent by weight of powdered metal binder.

As to claims 23 and 39, neither Mravic, Reese nor Goetzel, either alone or in combination, teach, disclose or suggest a liner for a shaped charge compressive formed from a mixture of 50 to 90 percent by weight of tungsten and 50 to 10 percent by weight of powdered metal binder including lead and a metal selected from the group comprising tantalum, molybdenum and combinations thereof.

As to claims 26 and 42, neither Mravic, Reese nor Goetzel, either alone or in combination, teach, disclose or suggest a liner for a shaped charge compressive formed from a mixture of 50 to 90 percent by weight of tungsten, 1 to 20 percent by weight of lead, 1 to 30 percent by weight of tantalum and 1 to 30 percent by weight of molybdenum.

As to claims 27 and 43, neither Mravic, Reese nor Goetzel, either alone or in combination, teach, disclose or suggest a liner for a shaped charge compressive formed from a mixture of 50 to 90

PAGE 21/48 * RCVD AT 4/21/2004 9:33:25 PM [Eastern Daylight Time] * SVR:USPTO-EFXRF-1/0 * DNIS:8729306 * CSID:2143638177 * DURATION (mm-ss):16-44

percent by weight of tungsten, 1 to 20 percent by weight of lead and 1 to 30 percent by weight of tantalum.

As to claims 28 and 44, neither Mravic, Reese nor Goetzel, either alone or in combination, teach, disclose or suggest a liner for a shaped charge compressive formed from a mixture of 50 to 90 percent by weight of tungsten, 1 to 20 percent by weight of lead and 1 to 30 percent by weight of molybdenum.

As to claims 29 and 45, neither Mravic, Reese nor Goetzel, either alone or in combination, teach, disclose or suggest a liner for a shaped charge compressive formed from a mixture of 70 to 99 percent by weight of tungsten and 30 to 1 percent by weight of powdered metal binder including lead and tantalum.

As to claims 32 and 48, neither Mravic, Reese nor Goetzel, either alone or in combination, teach, disclose or suggest a liner for a shaped charge compressive formed from a mixture of 70 to 99 percent by weight of tungsten and 30 to 1 percent by weight of powdered metal binder including lead, tantalum and copper.

As to claims 33 and 49, neither Mravic, Reese nor Goetzel, either alone or in combination, teach, disclose or suggest a liner for a shaped charge compressive formed from a mixture of 70 to 99 percent by weight of tungsten and 30 to 1 percent by weight of powdered metal binder including lead, tantalum and molybdenum.

As to claims 34 and 50, neither Mravic, Reese nor Goetzel, either alone or in combination, teach, disclose or suggest a liner

PAGE 22/48 * RCVD AT 4/21/2004 9:33:25 PM [Eastern Daylight Time] * SVR:USPTO-EFXRF-1/0 * DNIS:8729306 * CSID:2143638177 * DURATION (mm-ss):16-44

for a shaped charge compressive formed from a mixture of 70 to 99 percent by weight of tungsten and 30 to 1 percent by weight of powdered metal binder including lead, tantalum, copper and molybdenum.

As to claims 35 and 51, neither Mravic, Reese nor Goetzel, either alone or in combination, teach, disclose or suggest a liner for a shaped charge compressive formed from a mixture of 70 to 99 percent by weight of tungsten and 30 to 1 percent by weight of powdered metal binder including lead and molybdenum.

As to claims 38 and 54, neither Mravic, Reese nor Goetzel, either alone or in combination, teach, disclose or suggest a liner for a shaped charge compressive formed from a mixture of 70 to 99 percent by weight of tungsten and 30 to 1 percent by weight of powdered metal binder including lead, molybdenum and copper.

According, even taking the teaching of Reese, together with the teachings of Mravic and Goetzel does not result in the invention of independent claims 1, 9, 23, 29, 35, 39, 45 or 51. The applicant therefore believes that claims 1, 9, 23, 29, 35, 39, 45 and 51 are allowable. In addition, taking the teaching of Reese, together with the teachings of Mravic and Goetzel does not result in the invention of dependent claims 26-28, 32-34, 38, 42-44, 48-50 or 54. The applicant therefore believes that claims 26-28, 32-34, 38, 42-44, 48-50 and 54 are allowable. All other claims

PAGE 23/48 * RCVD AT 4/21/2004 9:33:25 PM [Eastern Daylight Time] * SVR:USPTO-EFXRF-1/0 * DNIS:8729306 * CSID:2143638177 * DURATION (mm-ss):16-44

rejected under 35 U.S.C. §103(a) depend from an allowable base claim and are therefore also allowable.

Conclusion

In view of the forgoing, the Examiner is respectfully requested to reconsider and withdraw the outstanding rejection to claims and allow claims 1-54 presented for consideration herein. Accordingly, a favorable action in the form of a notice of allowance is respectfully requested. The Examiner is requested to call the undersigned for any reason that would advance the instant application to issue.

Dated this 21st day of April, 2004.

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PAGE 24/48 * RCVD AT 4/21/2004 9:33:25 PM [Eastern Daylight Time] * SVR:USPTO-EFXRF-1/0 * DNIS:8729306 * CSID:2143638177 * DURATION (mm-ss):16-44

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